

The knee-jerks were normal, and ankle clonus was not present. Touch, pain, and temperature-sense were normal on the arms, legs, and face; but later, when the power in the arms had returned and she could grasp well, it was discovered that she could not recognize objects by touch. This test, of course, could not be made while she was unable to handle objects. Smell and taste were normal throughout the course of the disease.

Dr. John T. Carpenter examined her eyes and reported as follows: "Central vision normal; field for form and color strictly normal. No reversal of the fields. No pathological changes in the eye-grounds. Refraction error; moderate hypermetropia. No diplopia except when red glass interposed, when vertical diplopia results and is constant. Right hyperphoria 2', which is concomitant, not parietic. Ocular movements normal, though both adduction and abduction are below par (15° — 5°). The only important factor elicited was the discovery of constant right hyperphoria." The sphincters were under complete control.

On first seeing the patient I did not regard her as seriously ill, but when the facial palsy appeared, followed by the difficulty in swallowing, the nasal speech, and the great muscular weakness, I began to fear a very serious issue, and believed that there was organic disease in the bulb and upper cervical cord or in the neighboring bones. Events proved this was an error, for after a few months she improved rapidly, and now is quite well.

There is no specific in the treatment of asthenic bulbar palsy. Rest is the most important element. The patient should be put to bed; faradism does harm; galvanism is of doubtful benefit; massage is useful. As to medicines, arsenic, in our experience, is the one drug which seems to be of benefit.

A STUDY OF A CASE OF GONORRHOËAL ULCERATIVE ENDOCARDITIS, WITH CULTIVATION OF THE GONOCOCCUS.

BY AUGUST JEROME LARTIGAU, M.D.,
OF NEW YORK CITY,

TUTOR IN PATHOLOGY, COLLEGE OF PHYSICIANS AND SURGEONS, COLUMBIA UNIVERSITY; PATHOLOGIST TO THE SLOANE MATERNITY HOSPITAL; ASSISTANT PATHOLOGIST TO THE ROOSEVELT HOSPITAL.

(From the Department of Pathology, College of Physicians and Surgeons, Columbia University.)

NOTWITHSTANDING the wide influence of the original assertion of Bumm that gonorrhœal processes remain limited to mucous membranes, the fact has been clearly established that the gonococcus may, under certain conditions, incite the production of a series of lesions in the body tissues generally, as dissimilar in pathological significance as they are varied in their clinical aspects. Such a relationship has been

well shown for certain gonorrhœal complications of the joints, peritoneum, myocardium, and a few other tissues.

The case herein reported belongs to a small group of cardiac infections induced by the micrococcus gonorrhœæ. Although recognition of the possibility of endocardial complication in gonorrhœa is by no means new, the complete bacteriological proofs of its occurrence are few and recent. The bacteriological study begins with the description of the gonococcus by Neisser in 1879, but more particularly from the cultural studies of Bumm in 1885, and especially those of Wertheim in 1892.

The number of cases in which the proof of the purely gonococcal nature of the endocarditis may really be said to be fully shown is still very small; with my own this does not exceed six cases. Any new contribution of this kind will then have some importance and considerable interest.¹

For the history of the case I am indebted to the staff of the Roosevelt Hospital. It is as follows:

Lofton J., colored, native of the United States, aged twenty years, single, and a bell-boy by occupation, was admitted to the hospital on August 4, 1900, with loss of speech.

Family History. Unknown.

Personal History. Moderately alcoholic; no history of syphilis; has always been healthy to the time of present illness.

Present Illness. Although no statement was obtained from the patient, it has been ascertained that he had been suffering from urethral disease for the last eight weeks. Six weeks ago he was seized with a chill, followed by fever. Similar recurrences two or three times a week since then. He was forced to give up work, but did not go to bed. He is said to have been irrational on several occasions. This condition continued until yesterday morning, when it was observed that the power of speech was gone.

On entrance (August 4th) the following note was made:

Nutrition good; mucous membrane pale; tongue coated, moist, swollen, and with impressions along the edge; upper lip swollen and tender; pulse rapid, soft, good volume, regular in rhythm; radial artery not thickened; pulse 126; respiration 32; temperature 103° F. Facial expression heavy and dull; no prostration; power of articulate speech gone; occasionally appears to comprehend what is said to him, and will obey. Abdomen and extremities seem normal. On the left side a single inguinal gland is enlarged and firm. Examination of the lungs is negative. The apex beat is in the fifth space in the nipple line. A loud, systolic murmur, which is transmitted to the left, is heard at the apex. The liver does not appear enlarged, nor is the spleen palpable.

¹ Almost the whole bibliography of gonorrhœal endocarditis may be found in Marcel See's *Le Gonocoque*, Paris, 1895, and Thayer and Lazear's article, *A Second Case of Gonorrhœal Septicæmia and Ulcerative Endocarditis, with Observations upon the Cardiac Complications of Gonorrhœa*, *Journal of Experimental Medicine*, 1899, vol. iv. p. 8.

Later. Urine: amber, acid; 1020; no albumin or sugar; urea, 2.1 per cent.; no casts, pus, or blood. Restless, trying to get out of bed; restrained. Involuntary defection.

August 5th. A purulent urethral discharge was noticed. Same general condition. Iodide of potassium, in 20-grain doses every six hours, and mercury inunctions have been prescribed. (At this time syphilis was suspected.)

6th. Low, muttering delirium continues; takes nourishment badly. Phimosis is present. Circumcision by dorsal incision. Upper lip swollen.

9th. Condition remains unchanged. Urethral irrigations with potassium permanganate instituted.

11th. Patient drank about eight ounces of a 1:40 carbolic solution from an instrument dish. Stomach washed with magnesium sulphate; no harmful effects therefrom.

The daily bedside notes show very much the same condition until August 17th. The urethral discharge ceased and the irrigations were stopped. The temperature-chart up to this time shows an irregular curve, ranging from 99.5° to 103.4° F.

18th. The blood was examined, with the following result: Hæmoglobin, 80 per cent.; red cells, 4,106,000; white cells, 11,400.

24th. Condition the same. This morning the right elbow-joint was noticed swollen, hot, painful, and tender.

25th. The potassium iodide has been increased to 75 grains.

26th. The elbow-joint is less swollen, but still painful.

27th. The elbow swelling has disappeared, but some pain and tenderness still persist.

31st. Blood examination shows: Hæmoglobin, 54 per cent.; red cells, 3,128,000; white cells, 10,800.

Emaciating rapidly. All the way through the pulse has been between 100 and 150, usually above 130.

This clinical picture persisted until September 5th. The temperature, however, which has ranged from 100° to 102° F., went up on September 3d to 103° F., and the following day to 104° F. On the day of his death, which occurred September 5th at 7 P.M., the temperature was 103.8° F. During the day there had been some epistaxis and also bleeding from the mouth. The post-mortem examination was made fifteen hours after death. The following notes have been taken from the autopsy protocol:

Anatomical Diagnosis. Ulcerative endocarditis of the mitral valve, urethritis, acute splenic tumor with infarction, cloudy swelling of the liver and kidneys, oedema, and congestion of the lungs.

Body of a well-built, moderately emaciated negro. No subcutaneous oedema; no apparent enlargement of the superficial glands. Pupils moderately dilated and equal. Mucous membranes pale. Circumcision wound healed; no scars on glans. Subcutaneous fat pale and scanty.

Abdomen. Both layers of peritoneum smooth; no excess of fluid in the peritoneal cavity; foramen of Winslow patent. Appendix vermiformis passes upward behind the cæcum. Omentum dilated; glands not enlarged; right lobe of the liver extends 3 cm. below the costal margin. Diaphragm: fifth rib on the right side, sixth on the left in the mammary lines.

Both pleural cavities free from fluid.

Pericardium. Both layers smooth and normal; cavity contains about 50 c.c. of clear, yellow fluid.

Heart. Distended with fluid blood and chicken-fat and red post-mortem clots. The endocardium and valves on the right side present no abnormality. Adherent to the margin of the posterior segment of the mitral valve is an extensive and irregular but firmly attached thrombus. At the site of attachment the valve is in part destroyed. The chordæ tendinæ of the involved mitral segment are also in part covered with smaller thrombi; the same is also true of the papillary muscle. The measurement of the projecting thrombus on the mitral valve is variable; in some portions this is 1 cm. The average scarcely exceeds 0.5 cm. The myocardium is firm and, on section, of a homogeneous brownish-red color. Eccentric hypertrophy of the left heart. Coronaries normal.

Lungs. Both lungs present a similar appearance. The pleuræ are smooth; the lungs congested and oedematous. Bronchi contains a small amount of frothy fluid. Bloodvessels normal.

Spleen. Enlarged (13 x 8 x 5 x 6 cm.), soft, capsule smooth. On section, chocolate color; Malpighian bodies swollen, pulp increased, trabeculæ apparently not augmented. In the outer half in the upper quadrant of the organ a large yellow wedge-shaped area of tissue replaces that of the spleen proper (infarct).

Liver. Free from adhesions, softer than normal, and on section cloudy. Gall-bladder normal. Common duct patent.

Kidneys. Similar condition on both sides. Fatty capsule scanty, fibrous. Capsule strips off easily. On section, cortex markings indistinct; glomeruli moderately prominent; medulla and pelvis apparently normal. Both ureters, adrenals, testicles, the aorta, pancreas, œsophagus, stomach, intestines, bladder, larynx, and trachea normal.

The floor of the deep spongy urethra presents a small granulating patch covered with a small amount of pus.

Brain normal. Cord not examined.

Microscopical Examination. The histological study of the various tissues confirmed the gross findings. In the alveoli of the lungs a small number of red cells and a few leucocytes were present as well as a moderate number of desquamated epithelial cells and granular material. The microscopical picture of the spleen was typically that of acute splenic tumor; the infarct presented no noteworthy features. Sections of the spleen and portions of the infarct stained for bacteria with Loeffler's methylene-blue and Sterling's gentian-violet failed to show any micro-organisms. In the kidneys two or three areas of round-cell infiltration were seen in the cortex, otherwise the lesion was merely one of albuminous degeneration.

The affected portion of the urethra showed losses of epithelium, with considerable round and polymorphonuclear-cell infiltration in the tissue underneath. A considerable number of micrococci arranged in pairs, with the characteristic morphology of the gonococcus, were present on the surface and in the inflamed tissue. They decolorized by Gram, and some were noted with an intracellular distribution within polymorphonuclear cells. Other cocci, oval in form and not decolorizing by Gram, were likewise present, having an extracellular position.

Heart. The myocardium showed nothing further. Sections through the affected mitral valve and adhering thrombus present several noteworthy features. The thrombus consists of masses of fibrin, some red

cells, and many leucocytes. Portions of the valvular connective tissue show small areas of necrosis along the margin, and considerable numbers of round cells; here the leucocytic infiltration is very great. Sections stained by Weigert's modification of Gram's method show no bacteria. Stained with Sterling's gentian-violet or Loeffler's methylene-blue a few "biscuit-shaped" cocci, for the most part arranged in pairs, may be observed occasionally within the polymorphonuclear leucocytes, more often extracellular.

Bacteriological Report. Tube and plate cultures from the heart's blood, lungs, spleen, liver, splenic infarct, right kidney, gall-bladder, urinary bladder, and bone-marrow were made upon solidified blood-serum (bullock's) and agar-agar.

Particular attention was given to the cultivation of micro-organisms from the valvular vegetations. After searing the surface of the latter very thoroughly cultures were made from several places upon agar-agar, solidified blood-serum, Laitinen's medium,¹ and in a mixture of ascitic fluid and ordinary peptone agar-agar containing 2 per cent. glucose. The ascitic fluid and agar-agar were mixed in equal parts. In this series of cultivations from the heart lesion those upon simple agar-agar proved negative. In one blood-serum tube two small gray, discrete, pinpoint-sized colonies were observed at the end of forty-eight hours. Cover-slips showed them to consist of diplococci, often having the characteristic "biscuit" morphology. They decolorized by Gram. Transplantation to ordinary agar-agar gave no results at the end of one week in the incubator at 37° C.; when transplanted upon Laitinen's medium, or to the mixture of sugar agar-agar and ascitic fluid, a scanty growth could be obtained, made up of cocci presenting the same general morphological and tinctorial character. In three of the plates containing Laitinen's mixture, growths consisting of six to eleven discrete white or gray colonies were obtained; the two others were still sterile at the end of nine days. Of the four plates of the sugar agar-agar and ascitic fluid mixture one gave one colony and another three colonies. Both were made up of cocci similar in all respects to those of the other cultures. Subcultures in peptone bouillon, glycerin broth, gelatin, on peptone agar-agar, potato, and glucose agar-agar were invariably negative. (The reaction of these media (potato excepted) was 1.5 + to phenolphthalein.) Transplantations to solidified blood-serum (bullock's) gave variable results. There were as many failures as positive results. When successful their growth was very scanty and the viability short. Cover-slip preparations invariably showed the same moderate sized coccus, generally with diplo arrangement, and often with the "biscuit" morphology. They stained readily with gentian-violet, fuchsin, and Loeffler's methylene-blue; decolorization with Gram was prompt.

Animal Experiments. A suspension of four colonies was made in 5 c.c. of sterilized peptone broth and the whole inoculated intravenously in equally divided doses into two young rabbits (787 and 910 grammes respectively).

For two days the animals seemed unusually quiet, but since then no untoward effects have been observed (over one month of observation).

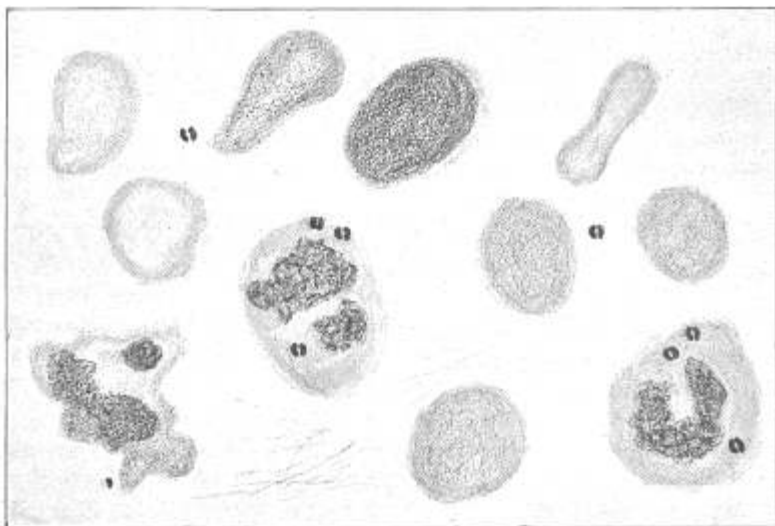
¹ Taav. Laitinen. Beitrage zur Kenntniss der Biologie des Gonococcus (Neisser), Centralb. f. Bakt. u. Parasit., 1898, vol. xxiii. p. 874. This consists of cyst or ascitic fluid, and bouillon containing 1 per cent. peptone and 0.5 per cent. sodium chloride.

FIG. 1.



Photograph of the left heart, showing the mitral vegetations. Those on the chordæ tendinæ do not show in the picture.

FIG. 2.



Cover-slip preparation from the vegetation on the valve. Stained with gentian-violet. Leitz oil immersion 1/12, ocular 5. Enlarged.

Of the remaining cultures—heart's blood, liver, gall-bladder, spleen, splenic infarct, lung, kidney, bone-marrow, and urinary bladder—those from the spleen, lung, splenic infarct, bone-marrow, and kidney remained still sterile at the end of nine days. From the liver, gall-bladder, and urinary bladder a pure culture of a moderately motile, gas-producing bacillus, which produced indol, was obtained. Tinctorially and culturally the organism behaved like the bacillus coli communis.

The cultures from the heart's blood all proved negative except in a single blood-serum tube, in which one small gray colony was observed at the end of forty-eight hours. It consisted of cocci quite similar to those already described in connection with the cultures from the valves. It also decolorized when stained by Gram's method. Transplantation upon simple agar-agar, blood-serum, and the sugar agar-agar and ascitic fluid combination were unsuccessful. The organism was lost, owing to the failure of recultivation.

Summary of Bacterial Findings. Gonococcus in the heart's blood and valvular vegetations; bacillus coli communis in the liver, gall, and urinary bladders. Remaining organs sterile.

The morphological characters and cultural behavior, taken with the tinctorial reactions of the micro-organism isolated from the blood and valvular vegetations, certainly, are so conclusive that no reasonable contention can possibly arise as to the gonorrhoeal nature of the septicæmia and endocardial lesion.

The number of cases in which the evidence of the purely gonococcal nature of the complicating lesion may be considered definitely proven is so few that it seems worth while recapitulating their main features.

The first case really belonging to this group was reported by Thayer and Blumer;¹ the gonococcus was obtained in pure culture twice during life from the blood, and was found microscopically post-mortem in the affected regions. In the case of Dauber and Borst² the gonococcus was obtained from the heart's blood in pure culture. As to the identification of this organism the authors were in doubt, but most observers agree as to their identity with the gonococcus of Neisser. In the third instance, reported by Thayer and Lazear,³ these observers obtained gonococci in pure culture three times during life from the circulating blood and also from the lesions of the heart and pericardium post-mortem. From a fourth case, reported by Rendu and Halle,⁴ a pure culture of gonococci was obtained during life from the endometrium and demonstrated in cover-slips of exudate from the elbow-joint. A pure culture was obtained from the heart lesion after death. Still more

¹ Thayer and Blumer. Endocardite Ulcéreuse blennorrhagique. Arch. de Méd. Exp. et d'Anat. Path., 1895, Tome vii. p. 701.

² Dauber and Borst. Maligne Endocarditis im Anschluss an Gonorrhoea. Deutsch. Arch. f. klin. Med., 1896, Bd. lvi. p. 231.

³ Thayer and Lazear. Loc. cit.

⁴ Rendu and Halle. Bull. et Mém. Soc. Méd. des hôp. de Paris, 1897, 3 série, Tome xiv. p. 1325.

conclusive than any is that of Lenhartz,¹ in which he obtained a pure culture of the micrococcus gonorrhœæ from the aortic valve vegetations, and, inoculating some of this into a previously healthy human urethra, incited urethritis with purulent discharge, in which organisms in every way, morphologically and tinctorially, typical of the gonococcus, were demonstrated. Finally, from my own case—the sixth—I succeeded in demonstrating microscopically the gonococcus in the urethra and valvular vegetations. I was further able to cultivate this micro-organism in pure culture from the blood of the heart and mitral lesion post-mortem.

This complicating endocarditis of gonorrhœa is distinguished by no special anatomical feature from those endocarditides induced by the more common pyogenic bacteria. For the fifteen most probably purely gonococcal infections of the endocardium, Thayer and Lazear give the following table as to anatomical distribution. To this we have added our own case and that of Berg's²—an aortic lesion :

Left heart	{ Aortic, 8 Mitral, 3 Both, 2	Right heart	{ Tricuspid, 1 Pulmonary, 2
	13-76.5 per ct.		3-17.6 per ct.
Both sides: all four valves, 1-5.9 per cent.			

The symptomatology of gonorrhœal endocarditis is essentially the same as that met with in the other forms of ulcerative lesion. Complicating arthritis, when present, often precedes the heart affection; in others, as in the one which I have herein reported, the arthritic trouble may come on after the development of the cardiac lesion. Pericarditis is rare; in the case of Thayer and Lazear it was present. Councilman has reported one case in which myocardial abscess existed without any endocarditis.

CONCLUSIONS. 1. Gonococcal urethritis may be the starting-point for a fatal septicæmia induced by a pure infection with the gonococcus.

2. Endocarditis and arthritis are occasionally complications of such an infectious disease.

3. The endocardial processes may be incited by the gonococcus without the association of other organisms.

¹ Lenhartz. Ueber acute ulceröse gonorrhöische Endocarditis. Berl. klin. Woch., 1897, Bd. xxxiv. p. 1138.

² Berg. Pylonephritis and Ulcerative Endocarditis as a Complicating Factor of Gonorrhœa, Medical Record, 1899, vol. lv. p. 602.